Panel Discussion
From Technology to Standards to Practice

Training Workshop on Building Energy Efficiency Systems and Labelling

October 26, 2015
NIST, Gaithersburg, U.S.A.

Panel Participants

Stephanie Reiniche, Manager of Standards, ASHRAE

Helen Davis, Engineering Manager, Regulatory Affairs, Air Conditioning, Heating, and Refrigeration Institute

David Conover, Senior Technical Advisor, Pacific Northwest National Laboratory

Brendan Owens, Vice President of LEED Technical Development, U.S. Green Building Council

Ross Montgomery, P.E., Fellow ASHRAE, Quality Systems and Technology, Inc.

From Technology to Standards to Regulation to Practice

Path #1: Standards and Regulations

More well-established technology and design approaches

To encourage more consistent application

Path #2: Voluntary Programs

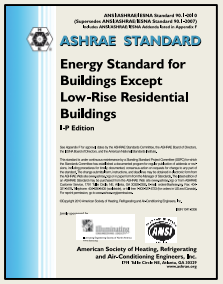
Newer technologies that have been demonstrated

To encourage innovation and higher performance

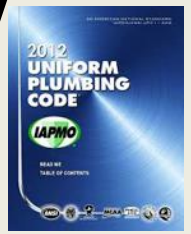
Technology > Standards > Codes > Practice

TECHNOLOGY
Research and practical experience

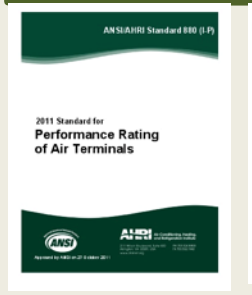
STANDARDS
Methods of test
Design



MODEL CODES



Equipment Rating and Certification



LOCAL BUILDING CODES

Technology > Standards > Codes > Practice

LOCAL BUILDING CODES

Government building owners
Other regulations

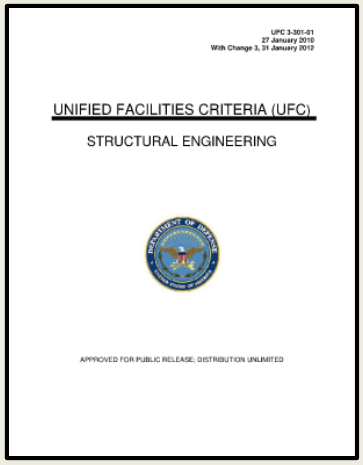

PBS-P100

GSA

PBS-P100

Facilities Standards
for the
Public Buildings Service

General Services Administration


UFC 3-301-01
27 January 2010
With Change 3, 31 January 2012

UNIFIED FACILITIES CRITERIA (UFC)

STRUCTURAL ENGINEERING

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

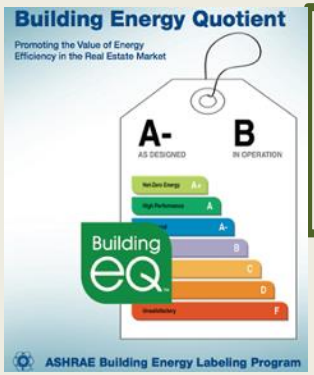
PRACTICE

Diverse design team
Other stakeholders
Operation & maintenance
(standards but not codes)

New Technology > Demonstration > Voluntary Programs

NEW TECHNOLOGY
Very efficient systems
New building design approaches

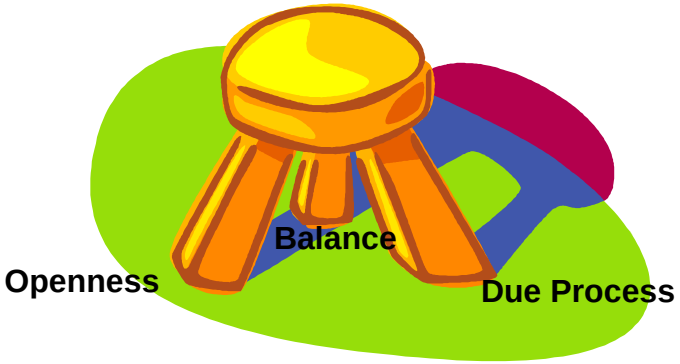
DEMONSTRATION PROJECTS
Experience in application
Performance data



VOLUNTARY PROGRAMS
Rating systems
Building labeling

Standards Development

- Revise (or Create) ASHRAE Standards
- Use processes that assure:
  - Openness
  - Due Process
  - Balance
- Developed under the ANSI consensus process.

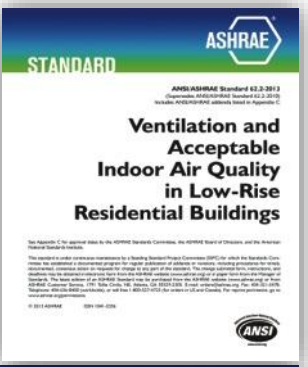


Types of Standards

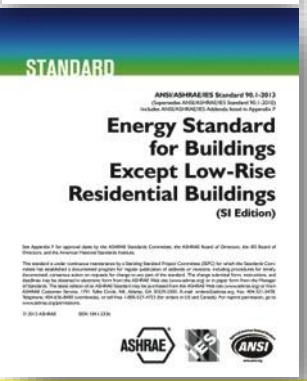
- Method of Test and Classification
- Design Standards
- Protocol Standards
- Method of Rating Standards

ASHRAE Standards

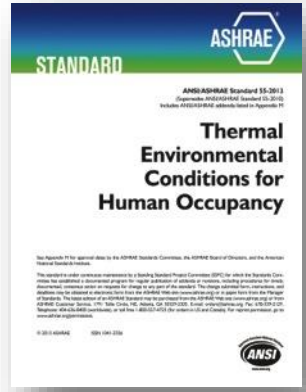
ANSI/ASHRAE Standard 193, Method of Test for Determining the Air Tightness of HVAC Equipment



ANSI/ASHRAE Standard 62.1, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings



ANSI/ASHRAE/IES Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings



ANSI/ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy

ANSI/ASHRAE Standard 62.2, Ventilation for Acceptable Indoor Air Quality

ANSI/ASHRAE/USGBC/IES Standard 189.1, Standard for the Design of High-Performance Green Buildings

Air-Conditioning, Heating, & Refrigeration Institute (AHRI)

- **Is one of the nation's larger trade associations**
  - Representing 314 HVACR and water heating manufacturers across 39 product sections
- **Promotes policies beneficial to industry**
- **Represents the industry domestically & globally**
- **Establishes international standards**
  - Over 100 industry standards and guidelines
- **Administers rigorous certification programs**
  - 40 Certification Programs
- **Administers a comprehensive industry statistics program**

AHRI CERTIFIED™ www.ahridirectory.org

AHRI AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE

we make life better™

Certification

- **Foremost globally recognized HVACR & water heating certification program**
- **Voluntary program**
- **Qualification is lengthy and rigorous**
- **400+ participants, 700+ Licensees**
  - 58 International Licensees from 16 countries
- **2,500 independent laboratory tests annually**
- **Accredited by Standards Council of Canada (SCC)**
- **ENERGY STAR approved Certification Body**
- **Dates back more than 80 years**
  - AHRI was formed from the merger of ARI and GAMA in 2008

Online Directory: www.ahridirectory.org

AHRI
AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE
we make life better™

Standards

- **AHRI has published over 100 standards and guidelines**
  - Many in both SI and I-P
  - Majority are American National Standards (ANSI)
  - An Accredited Canadian Standards Developer
- **Work with organizations and governments around the world to help them harmonize HVACR performance standards**
- **Work directly with codes bodies to ensure members' products are accurately represented**
  - ASHRAE (test procedures referenced in AHRI rating standards)
  - International Code Council (ICC)
  - Canadian Standards Association (CSA)
  - California Energy Commission (CEC) and Building Energy Efficiency Standards
  - International Association of Plumbing and Mechanical Officials (IAPMO)
  - National Fire Protection Agency (NFPA)
  - American Society of Mechanical Engineers (ASME)

ISO

IEC

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Advocacy

- **United States Congress**
- **Federal Agencies**
  - Department of Energy
    - AHRI Standards are referenced in the CFR
  - Environmental Protection Agency
    - Compliance with CAA Section 608
  - Department of Commerce
  - Federal Trade Commission
- **State Governments**
- **Foreign Organizations and Governments**
  - Standards Adoption and Harmonization
  - Performance Certification
  - International Trade Issues
  - Climate and Ozone issues
    - United Nations Environment Programme (UNEP)
    - Montreal Protocol

U.S. Building Energy Codes and Standards

Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Development

Voluntary Sector SDOs

Stakeholder participation

Revision every 3 years

ANSI/ASHRAE/IES 90.1

ANSI/ASHRAE/IES/USGBC 189.1

ICC IECC and IgCC

- Minimums have advanced significantly over time but diminishing returns challenge raising those minimums
- Increased interest in building performance formats in lieu of prescriptions
- Development of sustainable and green are going beyond minimum and create opportunities

Adoption

Federal, state and local government

Native American Tribes

Insurance and utilities

Incentive programs

Corporate policy

- There are a myriad of public and private paths to adoption
- The resources supporting application and use enhance the foundation needed as a basis for adoption
- Adoption of green and sustainable criteria that go beyond minimums reinforce the acceptability of minimums

Compliance

Review of plans

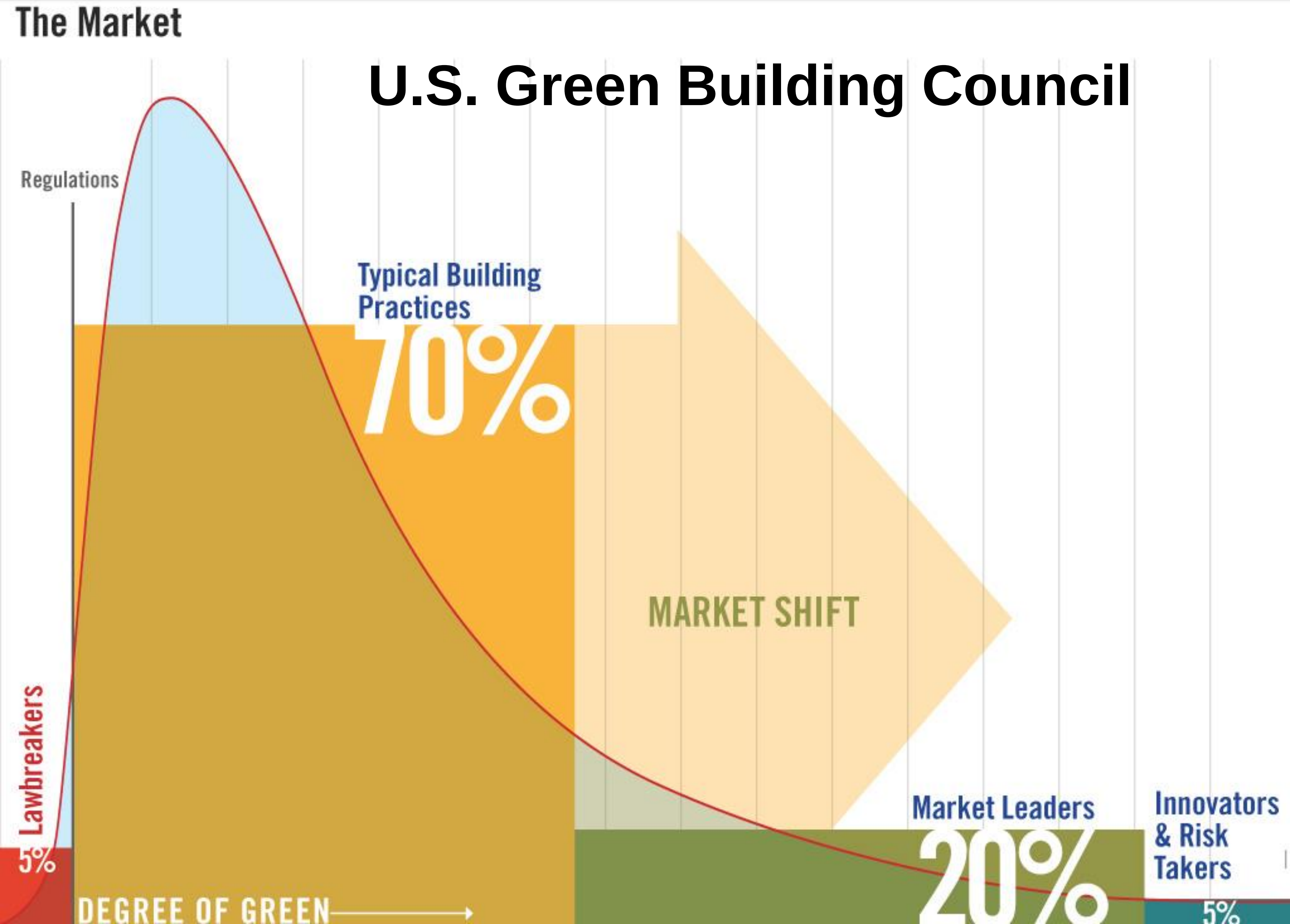
Inspection of construction

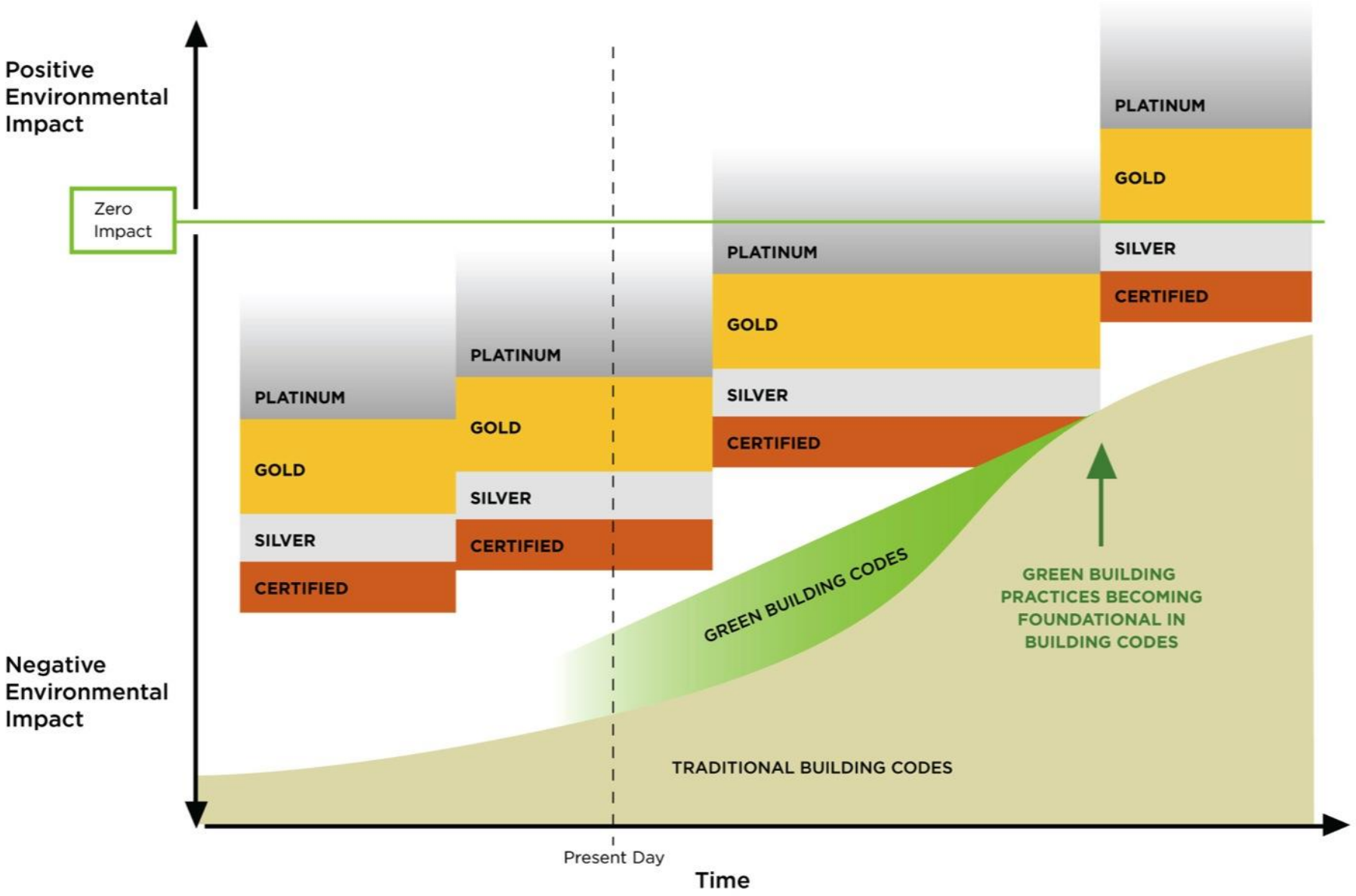
Testing and certification

Auditing of energy usage

- Evaluation of rates of compliance and ID of issues needing to be addressed
- Revise codes and standards to foster increased compliance
- Develop ways to improve how compliance is documented and verified

U.S. Green Building Council




Positive Environmental Impact
Zero Impact
Negative Environmental Impact
PLATINUM
GOLD
SILVER
CERTIFIED
PLATINUM
GOLD
SILVER
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PLATINUM
GOLD
SILVER
CERTIFIED
PLATINUM
GOLD
SILVER
CERTIFIED
GREEN BUILDING CODES
GREEN BUILDING PRACTICES BECOMING FOUNDATIONAL IN BUILDING CODES
TRADITIONAL BUILDING CODES
Present Day
Time

Ross D. Montgomery, P.E., CxA, FASHRAE
Quality Systems and Technology, Inc., Parrish Florida

ASHRAE Region 12

5 chapters/6 sections in Central/South America and Caribbean

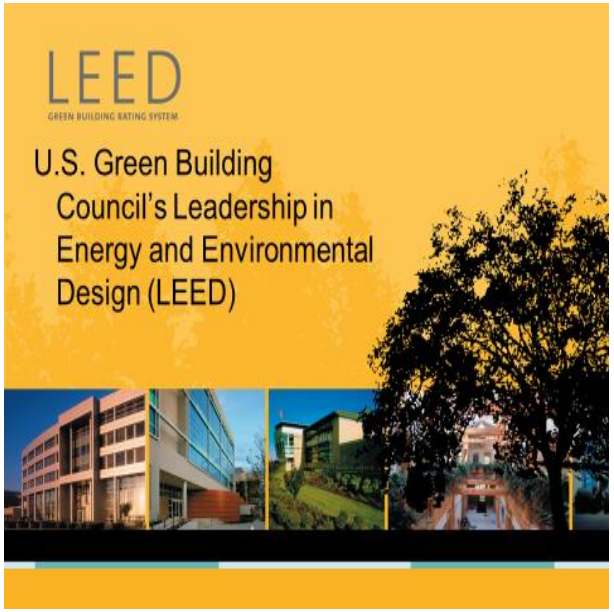
Puerto Rico, Colombia, Brazil, Argentina, Chile, Costa Rica, Panama, Dominican Republic, Peru, Ecuador, Paraguay.

What is the HVAC&R Marketplace in Central and South America?

- In general, Much different from the USA !!!
  - ❑ Mini-Split, Window Unit, Inverter, Cassette (60-75%)
  - ❑ VRF-Variable Refrigerant Flow (3-7%)
  - ❑ Chiller and chilled water (3-8%)
  - ❑ Other DX based (5-15%)
- Very little heat used (with the exception of extreme southern and mountainous areas)
- Refrigerant management is a “important” safety and environmental issue because of massive line sets that are needed to transport the refrigerants.

HVAC Labeling and Rating Programs: ASHRAE Building Energy Quotient (bEQ), Procel, LEED, World GBC.

Brazil-Procel



WORLD GREEN BUILDING COUNCIL

Designers can use in-country standards or Translated ASHRAE Standards/Guidelines

Portuguese:

Std. 90.1-2007

Spanish:

Std. 15-2007	Std. 170-2008/13
Std. 55-2010	Std. 180-2008
Std. 55-2013	Std. 189.1-2011
Std. 62.1-2007	Std. 202-2013
Std. 62.2-2007	Guideline 0-2000/13
Std. 90.2-2007	Guideline 1.1-2007
[working on Std. 105-2014]	
Std. 154-2003	Guideline 12-2000

ASHRAE Resources for Designers

- ASHRAE Green Guide
- Advanced Energy Design Guides
www.ashrae.org/freeaedg
- Indoor Air Quality Guide
www.ashrae.org/FreeIAQGuidance
- Procedures for Commercial Building Energy Audits
www.ashrae.org/pcbea
- Refrigeration Commissioning Guide for Commercial and Industrial Systems
www.ashrae.org/freeRefCxGuidance

What needs to happen ?

Establish updated In-country :

- Standards and Guidelines
- Energy efficiency and green building rating/labeling programs
- Commissioning guidelines and best practices
- HVACR certifications, professional registrations and continuing education.

Legislate requirements into law

- Model building codes
- Certification and registration for practice of engineering and design
- Energy Efficiency and Green building programs
- Building Commissioning
- Refrigeration management